

IN THE CLAIMS:

Claims 1-19 have been amended herein. All of the pending claims 1 through 19 are presented below. This listing of claims will replace all prior versions and listings in the application. Please enter these claims as amended.

1. (Currently Amended) A method for connecting a solder bump of an array of solder bumps on a semiconductor device and a contact site of a plurality of conductive contact sites of a member, comprising:

heating ~~said the~~ solder bump of ~~said the~~ array of solder bumps to a softening temperature T_s below a melting temperature of ~~said the~~ solder bump of ~~said the~~ array of solder bumps;
and

contacting ~~said the~~ contact site of ~~said the~~ plurality of conductive contact sites by ~~said the~~ solder bump of ~~said the~~ array of solder bumps of ~~said the~~ semiconductor device using a pressure less than substantially 22 grams-force ~~for said solder bump and another solder bump of said array of solder bumps~~.

2. (Currently Amended) The method of claim 1, wherein ~~said the~~ melting temperature of ~~said the solder bump of the~~ array of solder bumps is ~~T degrees Centigrade $T^{\circ}C$~~ higher than an ambient temperature T_0 , and wherein ~~said the~~ softening temperature T_s is in the range of about 0.5T to 0.95T above ~~said the~~ ambient temperature T_0 .

3. (Currently Amended) The method of claim 1, wherein ~~said the~~ solder bump of ~~said the~~ array of solder bumps contacts ~~said the~~ contact site of ~~said the~~ plurality of conductive contact sites at a pressure not substantially exceeding about 10 grams-force.

4. (Currently Amended) The method of claim 1, wherein ~~said the~~ solder bump of ~~said the~~ array of solder bumps contacts ~~said the~~ plurality of conductive contact sites at a pressure ~~of in~~ in the range of about 2 to 10 grams-force.

5. (Currently Amended) The method of claim 1, wherein said the semiconductor device having said the array of solder bumps is heated by one of hot air convection and infrared radiation.
6. (Currently Amended) The method of claim 1, wherein said the member having said the plurality of conductive contact sites is heated by one of hot air convection, conduction from a heated object, and infrared radiation.
7. (Currently Amended) The method of claim 1, wherein said the semiconductor device and said the member are placed in a temperature-controlled oven for heating to said the softening temperature Ts.
8. (Currently Amended) The method of claim 1, wherein said the semiconductor device is held in a chuck, said the chuck being heated.
9. (Currently Amended) The method of claim 1, wherein member the member is held in a chuck, said the chuck being heated.
10. (Currently Amended) The method of claim 1, wherein said the member having said the plurality of conductive contact sites is heated by electrical resistance wires.
11. (Currently Amended) The method of claim 1, wherein said the member and a substrate are mounted on a mounting board having an integral heater, said the integral heater controlled to heat said the member to said the softening temperature Ts.
12. (Currently Amended) The method of claim 1, wherein said the array of solder bumps comprises Sn-Pb solder having a lead content in the range of about 40 to about

98 percent, and ~~said the~~ softening temperature T_s comprises a range of about 140 to 180 degrees C $\text{180}^{\circ}\text{C}$.

13. (Currently Amended) The method of claim 1, wherein ~~said~~ heating comprises predetermining a heating time X to heat ~~said the~~ solder bump of ~~said the~~ array of solder bumps to ~~said the~~ softening temperature T_s , and heating for ~~said the~~ time X.

14. (Currently Amended) The method of claim 1, wherein ~~said~~ heating comprises initiating ~~said the~~ heating, measuring a temperature of one of ~~a~~ ~~the~~ member and ~~a~~ ~~the~~ semiconductor ~~die device being heated~~, and stopping ~~said the~~ heating to limit ~~the a~~ temperature of ~~said the~~ solder bump of ~~said the~~ array of solder bumps to no more than ~~said the~~ softening temperature T_s .

15. (Currently Amended) An apparatus for connecting a solder ball to a contact site comprising:

a first member having a solder ball thereon;

a second member having a contact site;

apparatus for moving ~~said the~~ first member against ~~said the~~ second member for contact of ~~said the solder ball to said the~~ contact site, ~~said the~~ first member contacting ~~said the~~ second member at a pressure less than substantially 22 grams-force for ~~said at least one the~~ solder ball; and

heating apparatus for heating ~~said the~~ solder ball and ~~said at least one the~~ contact site to a submelting ~~solder~~ ~~solder~~-softening temperature T_s .

16. (Currently Amended) The apparatus of claim 15, wherein ~~said the~~ contact site comprises one of a substantially flat surface, a recess for receiving a portion of a solder ball, and a recess having at least one projection therein for deforming a solder ball inserted therein.

17. (Currently Amended) A testing apparatus for a semiconductor package having a ball grid array of solder balls on a surface thereof, said the apparatus comprising: an insert formed of generally noncompliant material, said the insert having a first surface including an array of contact sites for contacting said the ball grid array of solder balls, balls and having a second surface; a substrate having a first surface, having a second surface, said the second surface of said the insert secured to said the first surface of said the substrate, and having a pattern of leads on said the substrate for connecting to contact leads in a socket; electrical leads connecting said the array of contact sites of said the insert with said the pattern of leads of said the substrate; a test board having said the socket with said the contact leads connected to a testing circuit, said the substrate and said the insert for insertion into said the socket for contact of said the pattern of leads of said the substrate with said the contact leads of said the socket; and heating apparatus associated with at least one of said the substrate, said the insert, and said the socket.

18. (Currently Amended) The apparatus of claim 17, further comprising temperature temperature-sensing apparatus attached to one of said the substrate, said the insert, and said the semiconductor package.

19. (Currently Amended) The apparatus of claim 18, further comprising a temperature controller for controlling said the heating apparatus.